

## REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Thus, claims 6-10 have been amended in response to the rejection of these claims under the second paragraph of 35 U.S.C. 112. In doing so, the last occurrence of the term "recovered" objected to by the Examiner has been omitted, and language has been added to clarify that the aqueous solution of mixed acid is the same acid mixture used from the previous claims, i.e., after that aqueous solution of mixed acid has been used to treat the metallic carrier catalytic device.

In view of these amendments, Applicants respectfully submit that the rejection of the claims under 35 U.S.C. 112 has been rendered moot, and should be withdrawn.

The patentability of the presently claimed invention over the disclosure of the reference relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Thus, the rejection of claims 1-10 under 35 U.S.C. 103(a) as being unpatentable over Vesely (U.S. '912) in view of Toshiyuki et al. (JP '619) is respectfully traversed.

### ***1. The Present Invention***

The present invention provides a method for separating and recovering a catalytic component-supporting wash coat from a metallic carrier catalytic device, which is characterized in that a metallic carrier catalytic device which is composed of a metallic carrier having a wash coat thereon, and a noble metal-containing catalytic component which is supported on the wash coat, is treated with an aqueous solution of mixed acid which contains sulfuric acid and nitric acid.

In the present invention, a spent metallic carrier catalytic device is treated with an aqueous solution of mixed acid which contains sulfuric acid and nitric acid. In this aqueous solution of mixed acid, sulfuric acid mainly dissolves metal oxides such as alumina which are contained in the wash coat, and serves to thereby render the wash coat brittle. Nitric acid forms an oxide layer on the surface of a metallic carrier, and thereby prevents the metallic carrier from being dissolved by sulfuric acid, or serves to protect the metallic carrier from dissolution.

Thus, according to the method of this invention as described above, a metallic carrier catalytic device is treated with an aqueous solution of mixed acid which contains sulfuric acid and nitric acid. Sulfuric acid acts to dissolve a catalytic component-supporting wash coat layer, and, simultaneously, nitric acid acts to form an oxide layer on the surface of a metallic carrier, and thereby prevents the metallic carrier surface from being dissolved by sulfuric acid. As a result, a catalytic component-supporting wash coat can be effectively separated and recovered from the metallic carrier without substantial dissolution of the metallic carrier.

## **2. *Distinctions between the Present Invention and the Cited Art***

Vesely discloses initially treating a deactivated catalyst, for example, platinum-alumina, with a strong mineral acid such as sulfuric acid, hydrochloric acid, nitric acid and the like, thereby converting alumina into a soluble compound, e.g., aluminum sulfate, and thus separating and recovering an undissolved platinum-containing residue.

Vesely, however, does not disclose or suggest treating a deactivated catalyst such as platinum-alumina with a "mixed acid" of sulfuric acid and nitric acid as presently claimed.

The Examiner asserts that: "Vesely also teaches use of nitric acid with sulfuric acid." This is, however, a misunderstanding on the part of the Examiner.

Vesely, column 1, lines 59-63, which the Examiner has cited, only shows a process of treating a deactivated catalyst with a strong mineral acid such as sulfuric acid, hydrochloric acid, nitric acid and the like, and does not disclose or suggest treating the same with a "mixed acid" of sulfuric acid and nitric acid.

Furthermore, in the subsequent passage of Vesely at column 1, line 64 to column 2, line 7, it is stated as follows:

"With catalyst other than platinum-alumina, the acid or base employed is dependent on the refractory inorganic oxide involved. Thus, where the refractory inorganic oxide is beryllium oxide, a concentrated sulfuric acid is suitably employed, and when the refractory inorganic oxide is vanadium oxide, nitric acid is suitable. The acid or base may be employed in sufficient concentration to effect the desired reaction. Sulfuric acid in from about 25% to about 90% concentration is suitable, with 35-70% being preferred. Nitric acid in about 37% concentration is satisfactory."

The above-quoted passage only teaches that a different kind of strong mineral acid should be used depending on the species of deactivated catalyst to be treated, and does not disclose or suggest treating the same with a "mixed acid" of sulfuric acid and nitric acid.

When a metallic carrier catalytic device is treated with only sulfuric acid, as taught by Vesely, it is impossible to recover noble metals at a satisfactorily high yield, as shown in Comparative Example 1 at page 8 of the present specification.

Thus, Vesely fails to teach or suggest the features and superior effects (advantages) of the present invention.

JP '619, which is one of prior art references discussed in the present specification (see page 2, lines 8-22), discloses a method which comprises dipping a metallic carrier catalyst which is composed of a metallic carrier substrate having formed thereon a refractory inorganic oxide layer containing noble metals in a solution of 30 volume % or more of sulfuric acid and/or phosphoric acid; heating the solution and dissolving a catalytic layer of the metallic carrier catalyst, thereby separating the metallic carrier catalyst into metallic carrier substrate and catalytic layer; and thus recovering noble metals from the resultant solution and from undissolved residue of the catalytic layer.

This reference, however, does not disclose or suggest treating a metallic carrier catalyst with a "mixed acid" of sulfuric acid and nitric acid as presently claimed.

In fact, JP '619 rather has Comparative Example 6, a working example where metallic carrier catalyst was treated with aqueous nitric acid solution. According to Table 4 of JP '619, which gives the results of this Comparative Example 6, it is shown that almost all of the noble metals (Pt, Pd and Rh) remained in the metallic carrier substrate; and that it was impossible to dissolve noble metals in the nitric acid solution. See the partial English translation of JP '619 cited in the IDS filed February 2, 2007.

Hence, one of ordinary skill in the art could not have foreseen from Comparative Example 6 of JP '619 that the combined use of sulfuric acid and nitric acid (see Examples 1 and 2 in Table 1 at page 10 of the present specification) would make it possible to recover noble metals (e.g., Pt, Pd and Rh) at a much higher yield than the use of sulfuric acid alone. See Comparative Example 1 in Table 1 at page 10 of the present specification.

Comparative Example 6 of JP '619 would have rather led those skilled in the art away from the presently claimed method of using sulfuric acid in combination with nitric acid for the purpose of treating a metallic carrier catalyst.

The present invention is therefore unobvious and patentable also over Vesely et al. in view of JP '619. Neither of these references teach or suggest treating a deactivated catalyst or metallic carrier catalyst with a "mixed acid" of sulfuric acid and nitric acid as presently claimed.

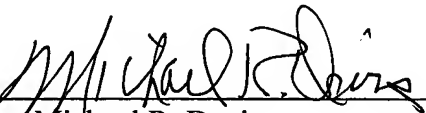
Even if the Examiner had established a presumption of obviousness based on the references, such presumption would be overcome by the comparative results set forth in the present specification, as discussed above, showing that the combined use of sulfuric acid and nitric acid (Examples 1 and 2 in the present specification) results in a much higher yield of recovering noble metals as compared to the use of sulfuric acid alone (Comparative Example 1 in the present specification).

For these reasons, Applicants take the position that the presently claimed invention is clearly patentable over the applied references.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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